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ABSTRACT

This study examines the influence of personality and cognitive attributes on innovation, focusing on student ability to adapt to changes in learning strategies. Tests were administered to 186 college students, evaluating their levels of self-esteem, need for social approval, dogmatism, critical thinking, reading achievement, and previous academic accomplishments. The students were then taught a "graphic organizer strategy" and, after one month, were tested for use of the strategy. The primary finding suggests that subjects scoring high on critical thinking, self-esteem, and high school average have concomitantly low dogmatism scores and tend to master the learning better than students with the inverse scoring profile. Other results indicate that reading achievement and need for social approval are not related to mastery of learning strategies, that self-esteem is related to observed use of new learning, and that dogmatism, critical thinking, need for social approval, academic achievement, and reading achievement have little influence on the observed use of the new strategy after mastery. The study concludes that knowledge of students' personality and cognitive attributes can be used to match learners with learning strategies that will produce optimum results. Implications for further research are discussed. (Author/RL)

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Resistance to Change: Relationship of Personality and Cognitive Ability to Innovation Diffusion Process

Paper Presented at:

College Reading Association Annual Meeting

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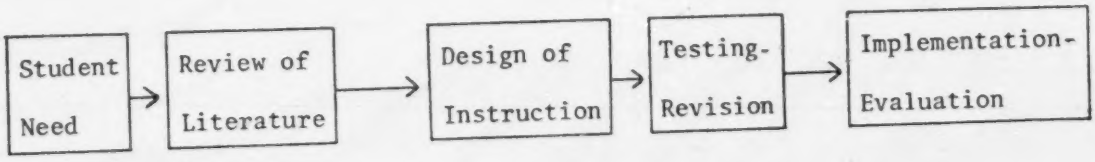
Background:

Many times during the last several years students have expressed frustration over the amount of information "learned" but "forgotten." Readings and discussions quickly vanish from memory. The investigation discussed was made in response to a need to find an instructional strategy which could help students to more efficiently retain information. The path the investigation took is diagramed: (show graphic 1)



What instructional strategies most effectively prepare students for new information and ideas? What antecedent conditions best facilitate new learning? Why do some students resist learning something new and valuable? Are there individual personality and/or cognitive factors which facilitate or impede the innovation-diffusion process?

Numerous theories and instructional practices have been proposed by psychologists and educators. There is sufficient evidence in the literature to support the view that Ausubel's theory of advance organizers (1963, 1968) and Barron's graphic organizer strategy (1969, 1971, 1972) aid retention. A large number of innovations however are not in widespread use or are used ineffectively (Loucks, 1977). Data collection on the innovation-diffusion process is not characterized by rigor (Carlson, 1968). This investigation had a dual purpose: to introduce graphic organizers as a strategy for improving retention and secondly, to study the innovation-diffusion process in first and second year students who attend an urban university.

NEED FOR STUDY:

An innovation is a change and by definition is a departure from what has gone before it. Innovations are neither good nor bad. The word has been used prominently in education since the dramatic events of the sixties and the launching of the Russian's Sputnik. New methods, materials and curricula were developed to meet new challenges.

Evidence indicates that the total number of educational innovations actually integrated into our schools during the last decade have been limited. Recently the term has taken on negative connotations.

Innovations have been blamed for many of the failures of our schools. Professor Mary Jo Bane of the Harvard Graduate School of Education at a recent conference of leading social scientists stated that there is little evidence to support the view that innovations in schools are widespread nor should they be blamed for the general trend toward lower standardized test results (New York Times, Sept. 21, 1977, 20). Even if innovations were widespread, it doesn't follow that they were connected to lower student scores.

On September 21, 1977 a New York Times headline read: "A 'Slow Motion' Decade is Predicted for Public Schools." There is negative feeling toward innovation. These feelings have spurred on the back-to-basics movement. There is mounting evidence that concludes that different individuals need different types of learning activities. While researchers continue to urge multiple paths for learning; for matching learning strategy with the style of the learner, the goals of traditional education are being reaffirmed.

Traditional education was not as successful as some would have us believe. In the past, memory replaced thinking, copying more valued than creating, filling in the blanks the rule and composing the exception.

Learning to ask questions, discuss, interpret, analyze and synthesize were not the primary goals of instruction. I do not mean to imply that basic reading instruction is irrelevant. Only that basic instruction is basic. Like everything else that is basic, it is a means to an end and not the end in itself. Certainly basic literacy is a must but there are many other crucial skills which also need to be taught.

After the basics are learned, we need to teach students to develop critical insights, their own, not ours. We need to help students to become acutely aware of what is logical and illogical, to argue logically and to analyze arguments for fallacies and bias. We need to teach students to analyze, to take things apart, if they are to understand how the parts, as well as the whole function.

Superficial analysis is not enough. Students need to know how to put things together, to synthesize, to see, after analyzing it as a whole, with new meaning. Analysis is only a means to an end. In the "good old days" it was an end. Perhaps the most basic of the basics is to create. Creating is the ultimate synthesis of what we know and demands confidence, knowledge, skill and the ability to "put it all together."

Innovation-Diffusion Process:

The innovation-decision process begins when the individual is exposed to the innovation's existence and gains some understanding of how it functions. An individual's decision to adopt an innovation is not an instantaneous act; rather it is a process that occurs over a period of time and consists of a series of actions. Characteristics internal to the individual influence the passage the decision process.

A function of the investigation was to study the relationship of self-esteem, need for social approval, dogmatism, sex, reading achievement, critical thinking ability, and previous academic achievement (internal characteristics) to learning and using graphic organizers, an innovative notetaking strategy (show graphic 2). If the individual does not define the new idea or strategy as relevant to him, considerations of the idea or strategy do not pass beyond the knowledge function. Attitude is a relatively enduring organization of an individual's beliefs about an innovation that presupposes his actions. In the innovation-diffusion process, the individual forms a favorable or unfavorable attitude toward the innovation.

Selection of Variables:

Fishbein (1967) asserted that the "chances of predicting behavior are practically nil until we start measuring attitudes toward the behaviors we are trying to predict (480)." Reaction to an innovation is dependent on an individual's sense of competency. It can be expected that individuals who have confidence in their abilities would be more likely to try innovations. It can be hypothesized that subjects who have done poorly in school will tend to be less likely to try new strategies which may appear threatening to them. The more competent an individual is in his own and others eyes, the greater his sense of self-esteem.

Self-esteem is directly affected by others evaluations. Through actions and attitudes an individual learns how others perceive him (White, 1963, 35). Watson (1967) and Chesler and Barakat (1967) studied the role of self-esteem in the innovation-decision process and concluded

that self-distrust and feeling of impotency leads an individual to resist change.

Rogers and Shoemaker (1971, 187-188) suggest that low empathetic ability, a high level of dogmatism, inability to deal with abstractions and low achievement motivation are factors which create barriers to change for an individual.

Rokeach (1960) investigated dogmatism or open-mindedness as a personality trait. It is defined by the following kinds of behavior:

1. An unwillingness to examine new evidence after an opinion is formed.
2. A tendency to summarily dismiss evidence or logic in conflict with one's position.
3. A tendency to view controversial issues in terms of absolutes.
4. The tendency to form strong beliefs which are resistant to change even on the basis of equivocal evidence.
5. A tendency to reject people because of their beliefs and to isolate contradictory beliefs in logic-tight compartments.
6. A need for early closure in reaching conclusions; an intolerance for ambiguity.

(Rokeach, 1960)

Rokeach described closed-mindedness as a cognitive style in which the interaction about the nature of the source and the information the source has communicated are evaluated separately. Open-minded people tend to be governed less by irrational forces and are able to resist external pressures to change while closed-minded people tend to

attitude
persuasion
decision
confirmation
knowledge

be unduly influenced by internal and external forces. Jamias (1964) concluded that less dogmatic subjects were more innovative and less influenced by community norms than closed-minded subjects. Lin et al. (1966) found that more open-minded teachers accept educational innovations. The more dogmatic a person, the more resistant to innovation (Lin et al., 1966; Mechling, 1969; Rogers and Shoemaker, 1971; Russell, 1971).

Not too unexpectedly, high closed-minded scores are correlated negatively with verbal ability, school achievement, initial adaptation to concept learning tasks and the ability to form remote verbal associations (Baker, 1964; Ladd, 1967, Zagona and Zurcher, 1965; Hunt, 1961). Dogmatism has been found to be inversely related to problem-solving ability and synthetic thinking and is positively correlated with anxiety (Fillenbaum and Jackman, 1961; Rokeach, 1960). Apparently the relationship of dogmatism to the comprehension of classroom material is not clear since in a number of studies with university sociology and psychology students (Christensen, 1963; Costin, 1965; Ehrlich, 1961 a, b; White and Alter, 1967; Zagona and Zurcher, 1965) correlations though generally negative, varied from -.54 to +.16. It seems clear that dogmatism and self-esteem comprise a cluster of affective-social and cognitive factors which influence learning. Moreover, highly dogmatic people seem predestined to do poorly in problem-solving and thinking tasks which require the possession of the opposite of many of the attributes listed.

The primary function of the school is to foster intellectual growth, the assimilation of knowledge. The school's role in personality development can only be supplementary to those of other socializing agencies such as the home, church and neighborhood. There is evidence

to support the contention that teachers who are better informed about student's personality structures and who are aided in designing specific plans to utilize this information will produce more effective learning. Knowledge is insufficient in itself and teachers need guidance in utilizing the knowledge to cope with learning problems by individual students.

Zaltman and Duncan (1977) raise the issue of literacy and change. They conclude that the ability to read increases the ability of the individual to comprehend change. Brown (1975) found that men adopted innovations more often than women. Hudspeth (1966) provides support for the notion that there exists a general orientation to the adoption of innovations. He found that faculty who used graphics are significantly more likely to have a favorable attitude towards all educational media than are those who do not use graphics in their teaching. Other researchers do not support this conclusion.

Carlson (1968) and Rogers (1971) conclude that there is no clear-cut evidence as to whether or not innovation behavior is completely consistent (192). The Rogers and Shoemaker (1971) model of the innovation-decision process was used in this investigation: (see graphic 2)

1. knowledge of the existence and function of the innovation
2. Attitude toward the innovation
3. Decision to adopt or reject the innovation
4. Confirmation and reinforcement of the decision

Knowledge of an innovation however does not necessitate nor guarantee its adoption. Katz (1963), Pelligrin (1966) and Havelock (1976) found that adoption is related to an individual's awareness of the need to change and to the extent that the innovation is relevant to perceived needs.

Individuals are not simple and any attempt to place them in neat categories would be unfruitful. Individuals will be more receptiv- to change when they see the change as useful for them.

It is impossible to cite all of the studies reviewed. Suffice to say that those already discussed are representative of the literature and were instrumental in the selection of dogmatism, need for social approval, reading achievement, critical thinking, self-esteem and high school accomplishment as variables for research consideration in this study. (graphic 3)

Organizers and Subsumtion:

According to Ausubel (1968) a major portion of all information and material to be learned is typically presented in more or less final form. It is not discovered independently by the learner as some have argued. According to Ausubel, it becomes the learner's task to comprehend the material and incorporate it into his cognitive structure. The learner then has the information available for reproduction and is able to relate it to other new learnings and problem-solving experiences at some future date. Cognitive structure is viewed by Ausubel as the major factor influencing the learning and retention of new materials:

> The stability, clarity and organization of a learner's subject-matter knowledge in a given discipline is hierarchically organized in terms of highly inclusive conceptual traces of specific informational data. The major organizational principle, in other words is that of progressive differentiation of trace systems of a given sphere of knowledge from regions of greater to

> lesser inclusiveness, each linked to the next higher step in the hierarchy through a process of subsumtion....Irrespective of how they are acquired in the first place (inductively or deductively), new materials are incorporated into a total cognitive organization in accordance with the same principle of progressive differentiation....Meaningful material enters the cognitive field and interacts with and is appropriately subsumed under a relevant and more inclusive conceptual system.
>
> (1963, 24-25)

According to Ausubel's theory, if a given learner possesses the necessary relevant subsuming concepts at appropriate levels of inclusiveness prior to a new learning task, he is better able to assimilate or incorporate new meaning into his cognitive structure through the process of subsumtion. Conversely, if a given learner does not possess the necessary relevant subsuming concepts prior to a new learning task, he is less able to assimilate or incorporate a new meaning through the subsumtion process.

As a means of maximizing the cognitive readiness of learners prior to learning new tasks, Ausubel has proposed the use of cognitive organizers that contain the necessary relevant subsuming concepts under which learners can "fit" or subsume new meaning. The operationalized form of cognitive organizer investigated by Ausubel was the advance organizer.

The principle of subsumtion is key to explaining how one increases and reorganizes knowledge. New ideas and information are grasped and retained by the learner "only to the extent that more inclusive and appropriately relevant concepts are already available in the cognitive

structure to serve a subsuming role or to provide ideational anchorage" Ausubel, 1968, 222). Thus more and more information is accumulated only to the extent that we are able to subsume it under the categories and within the cognitive framework we already possess, or through some simultaneous reorganization of this framework so that it can accommodate the new information into our existing knowledge. Moreover these reorganizational processes may or may not follow principles which seem "logical" to the observer because the real determinant is whether they are compatible with the organization which that learner has personally developed.

Ausubel outlines a number of ways for measuring these ongoing cognitive changes and identifies many factors which seem to facilitate effective information processing and retention. In many instances his resulting recommendations are similar to those of Bruner (1957, 1960, 1966). However, one type of educational intervention which is unique to Ausubel's theory and which is very important for the design of instruction is advance organizers.

He identifies attainment of a clear and stable organized body of knowledge as both an important educational objective and a means for enhancing the learner's capacity to learn new information. "This knowledge (cognitive structure), once acquired, is also in its own right the most significant independent variable influencing the learner's capacity for acquiring more new knowledge in the same field" (Ausubel 1968, 130). Thus it is important for the educator to find ways to help students attain this clear, stable organization of the information which is to be learned. Ausubel contends that this can be accomplished by providing advance organizers.

Advance organizers facilitate learning and retention of information in three ways:

1. They call attention to and build on those relevant anchoring ideas which the learner already has in his cognitive structure. Organizer refers to fundamental concepts and principles learned and can be used to relate past knowledge to what is to be learned.

2. They provide a kind of scaffolding for new material by encompassing the areas to be covered and by delineating the fundamental ideas under which other information can be subsumed. Having first identified previously learned fundamental and relevant ideas, the instructor then relates them to the anchoring ideas contained in the new material.

3. The stable and clear organization essentially renders it unnecessary for the student to learn the material by rote memorization. Ausubel contends that avoidance of rote learning procedures have a positive and motivating influence on the student and actually make newly learned information more useful in subsequent real-life situations.

Barron (1969) first proposed the use of graphic organizers. Graphic organizers are a form of cognitive organizer. Barron predicted that vocabulary of content area disciplines could be introduced in such a way that the words would assume the form of advance organizers and

provide students with cues to the structure of the subject (1969, 20). The graphic organizer was operationally defined as a "visual and verbal representation of the key vocabulary of a learning task in relation to more inclusive or subsuming vocabulary concepts that have previously been learned by the student" (1969, 41).

Research Approach:

Some psychologists have evinced the position that the study of simple behavior must precede the study of complex behavior. It has become customary for the experimental psychologist to formulate and test theories in the laboratory on data derived largely from the behavior of animals which can be studied intensively and subjected to experimental treatments. These methods cannot be used in a publicly supported educational system. Moreover by removing the animals from complex social environments the pure psychologist is able to study behavior uncontaminated by social variables, which while extraneous to his theory, normally operate in school situations. The classroom is however the natural behavior-field setting for educational research. Evans (1966), Sanford (1965) and Sherif (1961) make a case for the importance of research conducted in the classroom.

The goal of education must be the facilitation of change and learning. By this view the only man who is educated is the man who has learned to learn; the man who has learned how to adapt and change and who realizes that no knowledge is secure and that only the process of seeking knowledge is important. What is the influence of personality and cognitive ability on change? Are there personality factors which can be isolated which facilitate or impede learning something new?

Personality does not exist in the concrete sense. Allport has

defined personality as "the dynamic organization within the individual of those psychophysical systems that determine his characteristic behavior and thought" (1968, 28). Personality may be thought of as defining stable, self-consistent individual differences (Hall, 1957). Can we look beyond broad and general personality constructs suggested by such proponents as Carl Jung? Can we isolate specific factors within personality which tend to facilitate or impede the innovation or change process? Are there observable interactions which influence the innovation-adoption process? Or, is behavior so emeshed with past experiences, present realities and future possibilities that we are unable to consider it in light of its parts?

Rousseau (1964) in his preface to Emile challenges teachers "to study their pupils better." The implication is that teachers should make an effort to know and understand their students thoroughly for only then can they assist them in developing to their fullest potential. There is no universally better type of student; neither is there a universally better learning method. One type of student achieves greater satisfaction and responds better to one strategy than to another. One cannot investigate learner types independently of learning strategy.

The purpose of my investigation was to examine the influence of personality and cognitive attributes on innovation. Specifically, is knowledge of students' level of self-esteem, need for social approval, open-mindedness, reading achievement, level of critical thinking and knowledge of previous academic accomplishment useful in predicting the mastery and use of an innovative learning strategy? In this investigation graphic organizers were used as the substantive example of an innovative learning strategy.

Participants:

During the Spring of 1977 one hundred and eighty-six first and second year undergraduate students enrolled in sixteen social institution classes at the New School of Liberal Arts, Brooklyn College participated in the investigation. Research was conducted during regular social institutions colloquia. Participation voluntary and subject anonymity protected.

All participants were full-time students. Age ranged from seventeen to fifty-two with a median age of nineteen. Prior to instruction, tests were administered to establish each subjects' level of self-esteem and need for social approval (Coopersmith Self-Esteem Inventory), dogmatism (Rokeach Dogmatism E Scale), critical thinking (Watson-Glaser Critical Thinking Appraisal), reading achievement (Cooperative English Reading Comprehension and McGraw Hill Basic Skills Reading Comprehension). High school average was used as a measure of previous academic accomplishment. Reliability was established using Kuder-Richarson Formula 20 and 21 and ranged from .65 to .92 depending on the instrument.

Materials:

A series of studies preceded the investigation to establish procedures, evaluate and clarify teaching modules and methods of instruction. Revisions were subjected to further evaluation of prior to utilization in the investigation.

Procedures:

A trainer, using a script, taught graphic organizer strategy in sixteen social institutions classes. Each of the lessons took forty-five minutes. There were three instructional lessons in the instructional module. An observer was present to insure instrumental consistency. A lapse of one month was imposed between instruction and test of use of instruction. During this period no mention of strategy was made. A panel of judges rated subjects mastery and established two groups -- learners and non-learners.

Results:

An analysis of the data collected for this study has indicated several findings. (graphic 5) The primary finding is that subjects who scored high on critical thinking, self-esteem and high school average have concomitantly low dogmatism scores. These students tend to master the learning better than students exhibiting the inverse scoring profile. Reading achievement and need for social approval is not related to mastery of the learning. Self-esteem is related to observed use of new learning. The other factors which influence mastery however do not influence observed use. Dogmatism, critical thinking, need for social approval, academic achievement and reading have little influence on the observed use of the new learning after mastery.

It is also evident that the treatment procedures as employed in this experimental setting have a significant positive effect on mastery

and observed use of learning. Though not of primary importance to the originally stated hypotheses for the study, it appears that dogmatism is inversely related to high school average, critical thinking and reading achievement.

A multiple regression equation relating to all six independent measures to mastery accounted for fifty percent of the variance in the dependent measure. The multiple correlation coefficient between mastery and dogmatism, critical thinking and self-esteem was significantly higher than the multiple correlation coefficient between reading, need for social approval and high school average. A multiple regression equation for predicting mastery from scores on all independent measures considered collectively was computed in raw score form.

Conclusions:

Much testing of educational psychological theory and methodology has been conducted in "laboratory" settings. As a result, questions frequently arise concerning the findings and appropriate generalizations. This research is in keeping with an increased tendancy in psychology and education to use "real-life" settings. This research was conducted in actual ongoing social science classes in a large urban university. Other groups, in other settings, and in different disciplines should be studied.

Graphic organizers were used in this study as a substantive example of a newly acquired learning strategy. Future investigations should investigate the relationship of these characteristics to other newly acquired learnings at a mastery level. Greater generalizability of results would then be possible.

SUMMARY OF RESULTS

	1	2	3	4	5	6	7	8
1 high school average	-	NS	NS	.001	.001	.001	.01	NS
2 self-esteem		-	NS	NS	NS	NS	.001	.001
3 need for social approval			-	.01	NS	NS	NS	NS
4 dogmatism				-	.001	.001	.001	NS
5 critical thinking					-	.01	.001	NS
6 reading comprehension						-	NS	NS
7 mastery of learning							-	NS
8 observed use of learning								-

results valid for a two-tailed test with degrees of freedom = 184 or 127 as appropriate

Key

1 = high school average
2 = self-esteem
3 = need for social approval
4 = dogmatism
5 = critical thinking
6 = reading comprehension
7 = mastery of learning
8 = observed use of learning

Few educators question the importance of transfer. If transfer of learning were not possible, the learner would have to acquire new behavior for each situation. A follow-up study would examine the transfer of application of graphic organizers over a longer period of time, in other contents and disciplines using the same subjects.

Different individuals need different types of learning activities. In most college courses, there is a single teacher and a single set of instructional materials. If the student finds it easy to understand the instructor's communications about the learnings and the instructional material, he has little difficulty learning the course content. If he finds it hard to understand the instruction, the material or both, he is likely to have difficulty learning the subject. Learning the course content does not insure that the course content will become part of the student's conceptual make-up. In addition, not all individuals learn effectively by the same method or type of activity. Different individuals need different types of learning activities. For all students to use identical methods no matter what their ability or personality is a questionable procedure.

Increasingly researchers are urging multiple paths to achieve success and multiple criteria to measure success. The trend is toward more than one option for learning, toward options based more on cognitive processes, toward matching learning strategy with the style of learner. This investigation explored the relationship between self-esteem and dogmatism and learning one specific strategy. There is a significant relationship between these characteristics and methodology. As a result, teachers can employ the multiple regression formula, and assign instructional materials which optimizes achievement. Future investigations

could investigate the relationship of other personality factors with the learning of graphic organizers, the instructional method used in this research. The relationship of other instructional methods with dogmatism and self-esteem could also be investigated.

One cannot investigate learner types independently of learning strategy. There is no universally better type of student; neither is there a universally better learning method. One type of student achieves greater satisfaction and responds better to one strategy than to another. This study resulted in identifying those factors which facilitated the learning and using of graphic organizers, the innovation.

New strategies and innovations are constantly introduced into classrooms. This research highlighted the intereactions between self-esteem, dogmatism, previous academic accomplishment, reading achievement, need for social approval and critical thinking and observed student use of graphic organizers, an innovation. Implicit is the premise that learning does not necessarily entail the use of that learned information. There is more than an internal-external transaction between these characteristics and the learning and use of the innovative strategy. The interaction directly affected learning. Bloom et al. (1971) argued that verbal ability and reading achievement were the key factors influencing the learning process. Results of this research casts questions on Bloom's premise that self-esteem, dogmatism, and critical thinking are the key influences in learning. Bloom stated, "We may hope that research of the future will lead to the definition of the qualities and kinds of instruction needed by various types of learners," (1971, 48). Continued investigation is required. It appears that subjects with high self-esteem, low dogmatism and high critical thinking ability learn to graphically organize. There is a tendency for highly dogmatic subjects who master

the innovation to use it.

If the goal of education is the facilitation of change and learning and the only educated man is the man who has learned to learn, adapt and change and who realizes that no knowledge is secure and that the process of seeking knowledge is important, then we must continue to investigate factors which facilitate or impede the process.

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